DOCUMENT RESUME

ED 437 775 EC 307 623

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TITLE Basic Academic Preparation: A Report of the National Task Force on Quality of Services in the Postsecondary Education of Deaf and Hard of Hearing Students.

INSTITUTION National Technical Inst. for the Deaf, Rochester, NY.

SPONS AGENCY Association on Higher Education and Disability.; Office of Special Education and Rehabilitative Services (ED), Washington, DC.

PUB DATE 1997-00-00

NOTE 18p.; Also sponsored by the Conference of Educational Administrators of Schools and Programs for the Deaf (CEASD). Distributed in collaboration with the Postsecondary Education Programs Network (PEPNet).

AVAILABLE FROM Rochester Institute of Technology, National Technical Institute for the Deaf, Northeast Technical Assistance Center, 52 Lomb Memorial Drive, Rochester, NY 14623-5604. Tel: 716-475-6433 (Voice/TTY); Fax: 716-475-7660.

PUB TYPE Guides - Non-Classroom (055) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.

DESCRIPTORS *Basic Skills; Deafness; Developmental Studies Programs; Educational Legislation; English; Evaluation Methods; *Hearing Impairments; Higher Education; Partial Hearing; *Remedial Instruction; *Remedial Mathematics; Remedial Programs; *Remedial Reading; Student Evaluation; Writing Instruction

ABSTRACT

This report examines the need of many deaf and hard of hearing college freshmen for remediation in one or both of two areas, reading and writing in English and mathematics. It explores the kinds of assessments most commonly used in these areas, suggests modifications for testing basic instruction and remediation, and offers some programmatic guidelines. Individual sections of the report address the following topics: (1) assessment of basic skills; (2) basic preparation in reading and writing English; (3) skills necessary to enter courses/majors; (4) improving skills; (5) basic preparation in mathematics; (6) deaf students in mathematics classes; (7) recommendations for improving mathematics skills; (8) the first-year experience; and (9) laws and regulations. (Contains 22 references.) (DB)

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ED 437 775

National Task Force on Quality of Services
in the Postsecondary Education of
Deaf and Hard of Hearing Students

# *Report on*
# BASIC ACADEMIC PREPARATION

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National Task Force on Quality of Services in the
Postsecondary Education of Deaf and Hard of Hearing Students

# Report on
# BASIC ACADEMIC PREPARATION


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1997

Suggested citation:
Andersen, C., Boyd, B., Brecklein, K., Dietz, C., Gibson-Harmon, K., & Ishman, S.
*Basic Academic Preparation:* A report of the National Task Force on Quality of Services in the
Postsecondary Education of Deaf and Hard of Hearing Students.
Rochester, N.Y.: Northeast Technical Assistance Center, Rochester Institute of Technology.

Distributed by the Northeast Technical Assistance Center (NETAC) in collaboration with the
Postsecondary Education Programs Network (PEPNet) and co-sponsored by the
Office of Special Education and Rehabilitative Services (OSERS)
of the U.S. Department of Education (84.078A);
the Association on Higher Education and Disability (AHEAD);
and the Conference of Educational Administrators of Schools and Programs for the Deaf (CEASD).

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## *Editor's note*

This is one in a series of reports intended to assist postsecondary institutions in developing and maintaining special services of quality as needed by their deaf and hard of hearing students. Each report has been prepared with postsecondary administrators, faculty, and staff uppermost in mind, and particularly those most likely to have a role in providing services to these students. It is anticipated that these reports will be useful also to deaf and hard of hearing students in gaining more information about services for which they may be eligible.

A challenge in authoring and editing each of these reports is to avoid giving the impression that all the information they contain pertains equally to all deaf and hard of hearing students at the postsecondary level. Of course this is not so. These students are individuals first, and their needs and wishes for special services and other accommodations will vary, as will characteristics of the particular colleges and universities they as individuals choose to attend.

Also, it is a challenge to write about needs and services for both deaf and hard of hearing students together. While they do share a hearing loss, the magnitude of their hearing loss ranges collectively from mild to profound. But while the special needs of deaf students may be more apparent than those of hard of hearing students, the special needs of hard of hearing students are no less real.

Fifteen reports are scheduled for distribution in 1997 and 1998, each with a different focus and each authored by a working committee of experts on a particular subject. All are members of a **National Task Force on Quality of Services for Postsecondary Deaf and Hard of Hearing Students**. This task force was formed in 1994 and numbers 100 members associated with 32 two and four-year colleges in 28 states and provinces in the United States and Canada.

Readers are free to cite information and views from each of the reports and to duplicate and share copies. In return, they are asked to cite the names of its authors and make bibliographic reference to the report.

*– Ross Stuckless*

# BASIC ACADEMIC PREPARATION

*Catherine Andersen, Barbara Boyd, Kim Brecklein, Charles Dietz, Kim Gibson-Harman, Sybil Ishman*[1]

## Introduction

The basic academic preparation expected of most entering college students encompasses a wide range of skills. Like students in general, entering deaf and hard of hearing students vary in their preparation for college. Some have better academic foundations than others, and some are better prepared psychologically and socially for the college environment and its expectations.

The primary focus of this report is on deaf and hard of hearing college freshmen in need of remediation in one or both of two areas: (i) reading and writing in English, and (ii) mathematics. It will also explore the kinds of assessments most commonly used in these areas, suggest modifications for testing basic instruction and remediation, and make some suggestions of a programmatic kind. The report will close with a more generic discussion of needs and approaches to basic academic preparation and its corollaries, under the topic of "the first year experience".

It should be said at the outset that classroom support services such as interpreting, classroom assistive listening devices, and notetaking, important though they may be to many students, cannot substitute for basic academic preparation. These services go a long way toward removing obstacles to communication, but they alone will do little to bring the unprepared student up to the level of academic competence required by most college courses.

## Assessment of basic skills

Regardless of their student populations, virtually all postsecondary institutions today mandate outcome assessment in order to document student progress and to assist in program evaluation and planning. For placement purposes, institutions with open enrollment practices tend to assess students more carefully today than they have in the past.

Postsecondary institutions with enrollments of deaf and/or hard of hearing students need to be aware of special considerations regarding academic assessment measures and procedures with these students. The following suggestions may be helpful in providing more accurate assessment involving these students.

- *For the student who is more fluent in sign language than in English, consider alternative testing methods which allow for sign language interpretation of instructions or the examination itself.* Just as dyslexic students are sometimes given oral rather than written examinations, students who are deaf or severely hard of hearing and more comfortable with sign language than English may benefit from written examinations that are interpreted in sign language. However, since interpreted tests cannot be monitored by non-signing instructors, a bond of professional trust must exist between the instructor and the interpreter to make this feasible.

- *Avoid unnecessarily complex instructions and vocabulary that are subject to different interpretations.* If the deaf or hard of hearing student has difficulty deciphering reading material, it is likely that both vocabulary and grammar are involved. If so, this is probably evident also in his/her written work. Care should be taken that reading and writing deficiencies not be allowed inadvertently to mask the student's proficiency in the topic being tested.

- *Regardless of the strategy, extended testing time is normally necessary for any tests that involve more than limited reading.* If the deaf or hard of hearing student exhibits reading/writing weaknesses, extending the testing time may reduce the effect of these weaknesses on his/her test performance.

- *Don't rely on any single assessment tool, particularly for the student whose test performance falls below the expected level. Multiple assessments should be used for admissions placement and for documentation of progress.* Accurate assessment of any student's ability can only be achieved by multiple measures. Since the

[1] In the order listed above, the authors are associated with Gallaudet University (Washington, DC), California State University at Northridge (Northridge, California), Tulsa Community College (Tulsa, Oklahoma), Charles County Community College (La Plata, Maryland), William Rainey Harper College (Palatine, Illinois), and National Technical Institute for the Deaf (Rochester, New York).

performance of deaf and hard of hearing students often is assessed by tests that were not designed for them, this becomes even more critical for these students.

## Basic preparation in reading and writing English

It is a common perception that deaf and hard of hearing students compensate for their hearing losses through their vision. Indeed this is so in some areas, illustrated by the use of sign language and lipreading, but this does not *ipso facto* lead to their becoming superior readers and writers of English. In fact, most students with early onsets of deafness continue to struggle with English throughout their adult lives. Their situation is somewhat analogous to that of a foreign student who has grown up immersed in another language and another culture, and who as a college student, must make a concerted effort to learn a new vocabulary and very different grammatical structures (Charrow & Fletcher, 1975; Charrow & Wilbur, 1989). In fact, a college instructor might have difficulty distinguishing between the writing samples of many deaf students and international students for whom English is a second language.

Although the rate of high school graduation among deaf students has improved over the past several decades, the majority of these students continue to leave high school with reading levels at the fifth grade reading level or below. Most hard of hearing students graduate with higher reading levels than their deaf peers because they have greater access to the auditory reception of linguistic information. However, for the same reason, their reading levels are likely to be lower than those of their normally hearing peers, i.e., their hearing losses may not enable them to receive and process auditory information at full efficiency, even with sophisticated personal hearing aids and other assistive listening devices.

Moreover, because of their isolation from the plethora of incidental learning experiences that other students acquire daily and effortlessly by reason of their hearing, deaf and hard of hearing students may have an uneven conceptual context in which to place their reading and writing. In any event, these difficulties are likely to lead to problems in all academic areas that rely heavily on these language skills, and make graduation unlikely without remediation.

**Characteristics and backgrounds of students**. As stated repeatedly throughout this and other reports, the backgrounds and academic levels of deaf and hard of hearing students entering postsecondary institutions vary considerably from one to another. This includes their skills in reading and writing English.

All service-delivery models of postsecondary education for deaf and hard of hearing students will need to address standards relevant to literacy competencies with regard to students' entering, continuing, and exit criteria. Such standards are likely to vary as a function of the variety of postsecondary institutions attended today by these students.

Crucial to this matter is the necessity to prepare deaf and hard of hearing students, like all students, for today's work environments and the part played by skills in reading and writing. At the same time, we need to maintain respect for the repertoire of linguistic abilities and preferences each student brings to the college environment.

Many deaf and hard of hearing students will have no need for special help in developing their reading and writing skills beyond what is offered to all students as part of the regular college curriculum. However, others will have this need, calling for the development of a plan for basic or remedial academic preparation in English at the postsecondary level.

Before such a plan is developed, information about the student's communication history and academic goals should be obtained, much of which can be provided by the student him/herself. Among the most relevant questions are the following:

- ***What has the student's primary language or modality for instruction been up until now?*** If the student is hard of hearing, it is likely to be English in its spoken/auditory form, augmented by a personal hearing aid and perhaps an assistive listening device for classroom use. If the student is deaf, it may be ASL (American Sign Language) as used by native or near-native signers, signed English accompanied by spoken English, or oral (depending on a combination of speech and speechreading, usually augmented by the use of a personal hearing aid, assistive listening device, or increasingly today, by a cochlear implant device). "Cued Speech" is yet another variant on the simultaneous use of speech and signs used for communication by some deaf students today.

Large numbers of deaf students in mainstream classes at the elementary and secondary levels also have access to various forms of interpreting, including signed English, ASL, and oral interpreting. In addition, the use of reading in various forms, e.g., books, notes, chalkboard, computer screen, captions, should not be ignored as an invaluable medium of instruction. As we all know, reading is essential for acquiring and retrieving information, particularly at the college level.

- *What is the student's preferred mode of communication?* Most deaf students' communication preferences can be classified on a continuum extending from "oral-aural/no signing", through "oral-aural accompanied by signing", to "signing/no oral-aural" (usually ASL without voice). Most hard of hearing students prefer and depend on oral-aural communication alone, although many whose hearing loss is severe do sign.

- *What are the student's goals in enrolling in college?* Students who have clear and realistic internal goals tend to persist and perform better in college than those who do not. Is the student's goal to obtain a bachelor's degree or an associate degree, to take career-related courses leading to a certificate, or perhaps to take a few courses to improve his/her basic skills in order to be better prepared for employment and independence? Is the goal realistic in view of the student's basic skills? Is the student willing to "tough it out" to improve his/her basic skills as needed in order to move on to the next step in his/her plan?

Other questions that might be asked pertain to history of the student's hearing loss, e.g., age at onset of the loss, severity of the loss, and high school preparation and performance in specific areas such as English and math. Regarding these, there is sometimes a tendency to pass on deaf and hard of hearing students, passing them along even when they do not have adequate skills.

**Standardized tests**. A formal, standardized assessment of reading, grammar, and writing skills should be made. However, there are difficulties associated with the standardized testing of deaf and hard of hearing students across reading, writing, and other content areas, and several points made earlier under "Assessment of basic skills" warrant repetition.

First, the linguistic make-up of verbal test items may be confusing to some students. As a result, for all practical purposes, tests in math, science, history, etc., may tend to become mere reading tests with little efficacy for measuring a student's mastery of the intended subject area. If needed modifications are not made for deaf and hard of hearing students, the validity of such test results may be questioned.

Second, many assessment measures otherwise useful with special populations lack needed modifications in their administration procedures. Even some non-verbal tests are of limited value because the instructions themselves may present a barrier to students with limited English language skills (Hinkle & White, 1979, p. 84).

Third, orally presented instructions alone as presented to normally hearing students are unlikely to be satisfactory for deaf and for many hard of hearing students. Depending on the particular student, instructions for standardized tests, and indeed for testing in general, should be presented or interpreted in sign language, supported by the use of an assistive listening device, supplemented by printed instructions or demonstration, or some combination of these.

Two of the most challenging questions related to standardized assessment measures of deaf and hard of hearing students are the issues of (i) whether norms should be based on the general student population or on students who are hearing impaired, and (ii) whether tests should be criterion-referenced or norm-referenced. The Stanford Achievement Test (SAT-8) was designed to permit hearing impaired students' achievement to be compared with the achievement of both hearing impaired and hearing peers. Many experienced educators of post-secondary deaf and hard of hearing students argue that norm-referenced performance does not permit deaf students to show their true capabilities as well as criterion-referenced performance. Their argument centers around the inappropriateness of assessments that misinterpret deaf students' reading level as their level of knowledge. One such expert in this area states, "We need to be very cautious about interpreting results of clients [or students] who do not mirror individuals for whom the test was designed" (Zieziula, 1991, p. 3).

These general comments having been made, the reading sections of a number of standardized tests have in fact been modified and/or re-normed for use with hearing impaired students, albeit at the

elementary and secondary levels. Some can be useful also in determining the need for remedial intervention even among students at the postsecondary level. However, to date only the Stanford Achievement Test (SAT-8;with SAT-9 soon to become available) has been normed for this population (Spragins, 1989).

According to the Educational Testing Service (ETS), the English Language Proficiency Test (a test used with students for whom English is a second language) is currently being evaluated for its usefulness with deaf and hard of hearing students. Preliminary results indicate that this test may be an effective assessment tool for deaf and hard of hearing students, and particularly for those in programs that use an English as a second language (ESL) approach (J. Mounty, personal communication).

Institutions that serve large numbers of deaf and hard of hearing students such as the National Technical Institute for the Deaf (NTID), Gallaudet University, and California State University at Northridge (CSUN) have found combinations of tests useful. At NTID, the California Achievement in Reading Test and The Michigan Test of English Language Proficiency, along with holistically-graded written English course placement assessments and portfolio assessments are all used.

In addition to using Stanford Achievement Test (SAT-8) scores, Gallaudet University uses an English Placement Test (EPT) that measures writing, reading, vocabulary, and structure. Students are placed in appropriate courses based on this test. Students at the English 101 level take The Degrees of Reading Power Test, and are also required to pass the Freshman Writing Exam (FWE) in order to graduate. The EPT and FWE tests were designed by Gallaudet faculty whereas The Degrees of Reading Power Test is available commercially.

At CSUN, deaf and hard of hearing students are required to take an English Placement Test, but the university's Department of English gives priority to a student profile developed by CSUN's National Center on Deafness. This profile uses a combination of testing instruments; (i) a one-hour written essay scored holistically by CSUN faculty, (ii) the Michigan Test of English Language Proficiency, (iii) the high school GPA, and (iv) either the Scholastic Achievement Test (SAT) verbal score or the American College Test (ACT) composite score. Placement of students in developmental or regular freshman composition courses is based on these test results and, where necessary, on-site interviews with the students.

Many universities and colleges have established their own minimum acceptable scores on ACT or SAT tests for admissions and placement. By passing minimum standards on the ACT or the SAT, they have already demonstrated a particular level of competency.

English as a Second Language (ESL) proficiency tests have been suggested as reasonable alternatives which, according to their advocates, can provide more meaningful information than other types of evaluations, particularly when the developmental programs available to students use an ESL approach.

Many community colleges use standardized paper and pencil, multiple-choice tests or computerized English assessment systems to assess reading comprehension and grammatical skills of new students. These tests have minimum score levels required to obtain placement into English 101/freshman-level English. Again, caution must be used when relying on single assessments such as these. It is not unusual for very capable deaf or hard of hearing students to perform below freshman level English on testing. In institutions where an experienced English instructor/special education/deaf education specialist is available, it is valuable to consider "flex placement" (placing students in classes for a trial period, and moving them if appropriate, without penalty) rather than depend solely on test results.

Assessment of English skill should be ongoing. After initial placement, repeated assessments should be used to provide feedback for students and help measure their success. However, the instructor or tutor should not be disappointed if major summative gains in reading and writing are not achieved over a term or two. This does not signify that English learning has not occurred, but only that improvement tends to come in small incremental gains.

### Skills necessary to enter courses/majors

Implicitly or explicitly, entry-level tests have become associated with the minimum competencies in English required to begin taking other college courses. The idea is that students who can take English 101 are also likely to possess the necessary reading and writing skills to take other 100-level, and in some cases, 200-level courses. In fact, some colleges have assessment policies that require aca-

demic advisors to limit enrollment into college level course work for students who have not passed the English assessment test. Though they may be taking the necessary courses to improve their skills, they are not there yet, and it is only logical that placement in college-level courses would be setting these students up for failure. In colleges that do not have such an assessment policy, or in cases where a student has managed to circumvent the policy and register for courses not approved by the advisor, faculty are sometimes shocked by the writing skills of the students.

An important objective is to prevent some of this faculty shock by establishing and enforcing an English assessment policy. While proponents of self-determination might argue that an assessment policy is discriminatory and that it is the right of the student to try a course and possibly to fail, a fair and clearly administered assessment policy, when accompanied by a solid, effective plan for how to improve skills that are lacking, can be a tool that will ultimately increase students' chances of success.

## Improving skills

For students who do not "pass" the English assessment tests, basic instruction or remedial strategies can be employed. At least four basic strategies are used by postsecondary institutions to improve the reading, grammar, and writing skills of deaf and hard of hearing students who are not ready for "English 101" and other college-level work. Choice of strategy depends on the number of these students needing this attention at the institution, its size and budget, the theoretical orientation of those making the decision, and the linguistic profile of the particular student. These strategies include:

- *Mainstreaming into remedial classes.* Interpreters are used as needed. Deaf and hard of hearing students who are very close to an English 101 level of proficiency can sometimes benefit using this approach, but for students with bigger gaps between their skill level and college level, more intensive measures are necessary.

- *Self-contained remedial classes.* Many colleges with large numbers of deaf or hard of hearing students group those within the same range of proficiency into small self-contained classes for instruction in grammar, writing, and/or reading. These classes are usually taught by instructors with training and experience in teaching English to deaf students, often by instructors who themselves are deaf or hard of hearing.

If the class includes non-signing, oral/aural students (inclusive of most hard of hearing students), it is vital that the instructor use spoken English to communicate with these students. Often, under these circumstances, he/she will speak and sign simultaneously (signing in what is known as "Pidgin Signed English" - PSE). Similarly, if the class includes signing students, it is important that their instructor be proficient in ASL.

Several authors offer input regarding choice of communication mode in the classroom (Bahan, 1989; Baker-Shenck & Cokely, 1980; Humphries, Martin & Coye, 1989), and their comments should be considered when making placement choices. Where student numbers and their diversity permit, dividing the group based on both the students' communication skills and language needs, and adapting the language of instruction accordingly, is probably the best of the various alternatives. If dividing the students is not possible, probably the best choice of communication mode for a mixed group of students who sign ASL and those who do not is simultaneous communication (Baker-Shenk & Cokely, 1980).

- *Self-contained "English as a Second Language" (ESL) classes.* In the education of deaf students who are fluent users of ASL, increasing attention is being given to teaching them English as a second language (ESL). This is being done both in mainstream and self-contained classes. Underlying all ESL instruction is a bilingual, bicultural frame of reference (Barnum, 1984; Humphries, Martin & Coye, 1989; Kannapell, 1974).

The key to making such classes work is in staffing; if one person cannot be found who possesses all the requisite skills, teaming of instructors may be appropriate. Even though few deaf students are members of a "pure" first-language ASL group, i.e., born into families in which ASL is the prevailing language, many of the materials and principles used in ESL have great potential with these students.

The best-case scenario for such classes is groups of students whose preferred mode of communication is ASL with no voice, since students who prefer to use voice tend to sign in English word order and hybridize the ASL explanation and discussion of English. These students might be better served in equivalent hearing sections of ESL with an inter-

preter, where less contrastive analysis (between ASL and English) is used, but they still get the clear explanations of grammar and reading that are characteristic of ESL classes.

Students in these classes are all users of ASL, and accordingly more likely to be deaf than hard of hearing. Increasing numbers are foreign-born or living with parents who speak a language other than English, in which case English may be a third or even fourth language. This strategy is used in several colleges with sizable numbers of deaf students, particularly in those colleges with established programs for teaching English as a second language. ESL strategies and materials are used in these classes, but the conversation and listening practice elements found in regular ESL classes are eliminated.

Such classes are best kept small, i.e., five to 10 students, and can be taught by (i) a single instructor who is fluent in both ASL and linguistics/ESL methodology, or (ii) a team of two instructors - one whose background is ESL/linguistics and one whose background includes ASL linguistics and teaching deaf students. William Rainey Harper College in Illinois uses such an approach.

- *Mainstreaming into ESL classes with interpreters.* Mainstreaming deaf and severely hard of hearing students into ESL classes with interpreters has been a strategy used with increasing frequency at colleges with a small number of these students and an ESL program. Obviously these colleges have noted the linguistic parallels between many deaf/severely hard of hearing students and foreign students. However, it remains important that ESL faculty who have these students in their classes be consulted as to why the students are being placed in their classes, and how they are similar to, and different from other ESL students.

This mainstreaming/ESL strategy should be employed with caution, however, for several reasons. First, it is very difficult for deaf students in lower to intermediate-level ESL classes to succeed. Often at these levels, an emphasis is placed on listening and speaking proficiency, which is unfair to students with negligible speaking/listening skills; also, the task of following an interpreter and gleaning new linguistic information about English is very difficult when one has only a weak English foundation. Experience suggests that deaf and severely hard of hearing students at high intermediate or advanced levels of ESL (who may or may not have had self-contained classes prior to entering these levels) have better chances for success at these levels.

A second reason for caution pertains to the skill level of the interpreter. For interpreting in ESL classes, only interpreters with strong ASL skills and a good understanding of English grammar should be used. It is helpful if the interpreter has had some experience in classes with foreign students, since one of the biggest challenges reported by interpreters in the ESL classroom is interpreting for students with heavy accents who are quiet and/or difficult to understand.

**English summary**. For practitioners without much background in deafness, the process of meeting the academic preparation needs of deaf students in the area of English may seem complex and indeed baffling. If the reader feels this way, he/she is not alone; this has always been, and remains today the most perplexing, and arguably the most important challenge facing deaf students and their instructors.

Regardless of the instructional strategies they use, persons responsible for planning and providing English instruction for the basic academic preparation of deaf and hard of hearing students must constantly evaluate the effectiveness of any given program, seeking assistance as needed both inside and outside their institution. If the student is not making sufficient progress, administrators and instructors should be prepared to make recommendations for change even if it means suggesting another curriculum for the student within the institution or the student's transfer to a different postsecondary institution (including the option of a vocational training program which may make fewer demands on English).

## Basic preparation in mathematics

While the language difficulties experienced by many deaf students are well recognized, the problems facing them in the area of mathematics are not. For many deaf and hard of hearing students, their math achievement fares little better despite the fact that it relies less on reading and writing than do some other academic areas.

Changes now occurring in the teaching of mathematics will strongly influence the success experienced by these students. The effects of these changes on deaf and hard of hearing students will depend largely upon the ability of postsecondary institutions to include them in the unfolding curriculum.

**The changing mathematics environment**. Deaf students entering postsecondary institutions today are faced with new expectations due to the changing educational environment in mathematics. Since publication of the first volume of the mathematics standards proposed by the National Council of Teachers of Mathematics (NCTM) titled, "Curriculum and Evaluation Standards for School Mathematics" (NCTM, 1989), major changes have been occurring in the teaching of mathematics in the United States. The standards proposed by this and two succeeding volumes (NCTM, 1991, 1995) have received wide support from government, business, the public, and professional organizations in the area of mathematics, and are serving as a guide for major reforms in the teaching of mathematics in this country at all levels. In addition, under the sponsorship of the Annenberg Math and Science Project, Gallaudet University convened a committee of mathematics educators, educators of deaf students, and program administrators, leading to a report supporting the NCTM Standards as wholly appropriate for instruction of deaf students.

During the past 10 years, there has been a growing realization of the importance of quantitative literacy for all Americans, although its components are subject to various conceptualizations. Daniele (1993) has discussed possible components and their importance for overall literacy for deaf persons.

A report of the American Mathematics Association of Two-Year Colleges (AMATYC, 1995) has discussed mathematical reform, focusing mostly on the entering college student and remediation. As this document is operationalized in two and four-year colleges across the country, its implications for deaf and hard of hearing students in these colleges will be significant.

Expectations for deaf and hard of hearing college students will be that they can explain mathematical ideas in writing, apply mathematics to a broad variety of situations, and work effectively with peers in problem-solving situations. As technology is embedded in courses, they will be expected to be able to utilize advanced calculators and computer programs in solving mathematical problems. Placement tests, course examinations, and graduation requirements will reflect these expectations – expectations that require a high level of language skill, well developed cognitive skills, and a richness of life experiences consistent with those of their hearing peers.

**Characteristics and backgrounds of students in mathematics**. Little is known about the mathematics characteristics and backgrounds of hard of hearing students collectively, so this specific section will discuss deaf students only. Deaf students' achievement in mathematics has often been considered a strength, especially when compared with their achievement in English, i.e., reading and writing. It is necessary to keep in mind, however, that the primary measure of this achievement has been the Stanford Achievement Test (SAT-8, Mathematics Computation sub-test). In interpreting national achievement test scores, Thomas Allen (Dietz, 1995) cautions:

*It is an egregious error to conclude that a deaf student scoring "at the 10th grade level" in mathematics computation bears any resemblance whatsoever to a hearing 10th grader in terms of [overall] mathematical skill. Such a result simply means that the deaf student can compute (add, subtract, multiply, and divide whole numbers, fractions, and decimals, essentially) like the average 10th grader. No conclusions regarding any other mathematical skills should be inferred.*

These findings are important to keep in mind when considering mathematics reform. If current standards-setting in mathematics reform is veering away from purely computational operations in favor of those requiring mathematical reasoning and the ability to communicate verbally the underlying processes involved in mathematical problem-solving, then the previously reported optimistic findings regarding the computational skills of deaf children will be rendered irrelevant. Deaf students' persistent lack of English skills (reading and writing) will impose severe challenges for mathematics educators as they try to meet these new standards with their deaf students. (pp.47-48)

The NAPMERD report (Dietz, 1995) has recommended that the NCTM Standards be implemented in all elementary and secondary programs serving deaf students by the year 2000, but this recommendation is highly optimistic. What is clear, however, is that programs serving deaf students that are embracing the principles of the NCTM Standards and providing their students with more instruction with reform goals, are on the rise. It will be some time, though, before most deaf students entering postsecondary institutions will be ready to pursue college mathematics instruction as

proposed in the AMATYC report on a par with their hearing peers at similar levels.

To provide a more concrete description of many deaf students entering two-year colleges and other postsecondary programs, experience with students in Gallaudet University's Postsecondary Enrichment Program (PEP), a pre-freshman level program, will be described.

- *Understanding of mathematics.* The view of mathematics held by these students varies depending upon whether they have been successful or unsuccessful in "traditional" mathematics classes in the past. Students who have been unsuccessful view mathematics as unintelligible and difficult to learn. They see no rationale for the rules of computation and attempt to memorize the many combinations without looking for similarities or underlying concepts. Those who have been successful in past classes often are those students with good memories. They have been successful in remembering how to carry out computations and in implementing various "tricks" used to recognize the computations necessary to solve typical school textbook word problems. They view mathematics as a bag of tricks to be memorized, but not understood.

Unfortunately, neither group of students understands what needs to be learned in mathematics. In addition, the previously successful group strongly resists any change in the nature of the mathematics instruction under which they have been successful.

- *Weak cognitive skills.* Many students entering at this level have weak cognitive skills. They fit the description of what Feuerstein (1980) calls "retarded performers". These are adolescents who, due to lack of mediated learning experiences and limited communication with significant adults, have not developed the cognitive skills and habits to be successful in learning environments. He considers the failure of these performers to be "a function of demands imposed by an academically oriented and alien school system", and of cultural and communication difference (Feuerstein, 1980).

The encouraging aspect of Feuerstein's description is that he considers that the performance of these students can be substantially improved through a carefully designed program of instruction focused upon specific cognitive skills and behaviors. Students with underdeveloped cognitive functions are at an impossible disadvantage as the demand increases to gain conceptual understanding, solve problems in unique settings, and communicate about abstract ideas.

- *Lack of metacognitive skills.* Metacognitive skills refer to the ability to be able to view and describe one's own thinking. Increasingly, educators are realizing the benefit of asking students to explain their thinking as a means of focusing their learning on important relationships and concepts. This is an important thrust of the NCTM Standards and of reform curricula at college levels.

For students to be able to participate successfully in these types of activities, they need to have well developed metacognitive skills. Since much of the mathematics experience many deaf students have had in school involves doing computations to find answers or solving simple one-step word problems, they have not been given the opportunity to develop these metacognitive skills. To benefit from mathematics reform, these students need to be actively helped to think about their own thinking.

- *Not learning what is important.* Students who view mathematics as a series of rules used in finding answers to computational and word problems do not know what they should be learning in mathematics classes. They view each example as a process to be memorized, not as a situation to be analyzed and generalized. They are trying to learn skills and are not alert to concepts that might be the core of learning. Unfortunately, many deaf students entering postsecondary institutions fit this description.

If mathematics is to be successfully applied to problems in a variety of fields and situations, it is the understanding of the core concepts, not the attendant computational skills, that leads to success. Students not prepared for these approaches will not be successful.

- *Impulsive problem solving.* Students who have been exposed to mathematics mostly as rules to solve simple, single-step word problems are not prepared for the solution of real problems. Under modern mathematics instruction, a major goal in learning mathematics is to become a good problem solver, to be able to reach some sort of resolution for which there is no ready, direct means of solution. Without appropriate preparation and instruction, many deaf students exhibit impulsive behavior when faced with real problems involving mathematics.

Teachers of mathematical problem solving are familiar with the student who, after reading a problem, immediately stops working and says he/she cannot solve it. The expectation is that the instructor will provide the answer and the method of solution. Students with this perspective of problem solving will not do well under modern mathematics instruction. Many deaf students, even more than students who hear, have not had the types of problem-solving experiences that will be useful to them in their future classes and careers.

- *Fear of mathematics.* Finally, students who have not learned to understand mathematics and who have met only failure in the past, build up a fear of mathematics courses and mathematics itself. This mathematics phobia often blocks the student's ability to learn by creating stress and impulsivity around mathematics. For many students, this fear has a long history and is not easily overcome. The problem must be confronted directly, and with understanding.

**Standardized tests**. The need to use language that is understandable to the student in assessment activities has already been mentioned in the previous section dealing with English. It should be noted that as testing programs move toward measuring those outcomes encouraged under mathematics reform, i.e., conceptual understandings and problem-solving skills, the language load of tests will increase. Care needs to be taken that assessment instruments used with deaf students match the English reading levels of these students if valid conclusions about their mathematics progress are to be made.

Adding to this difficulty is the problem of deciding if students' lack of success on assessment is due to language, to gaps in incidental knowledge (experience), and/or to cognitive skill development. Most often, deaf students' difficulties on mathematics tests involving reading are attributed to difficulty with its language and not with its mathematics. This view may be too simplistic, overlooking important gaps that need attention in their knowledge of mathematics.

Traditional assessment measures have been used to determine students' mathematics abilities. Again, only the Stanford Achievement Test (SAT-8; math computation subtest) has been normed for deaf and severely hard of hearing students. However, additional commercially prepared math assessment tests have been used, especially in the areas of elementary algebra and geometry.

There remains a need for diagnostic instruments which can be used with older deaf students to help identify specific gaps in their conceptual understandings and applications of cognitive skills. At this time, the authors are not aware of any instruments that meet this need. Instructors are encouraged to experiment with techniques for diagnosis and to share their ideas and results with the field.

## Deaf students in mathematics classes

Many deaf students entering college programs find themselves in mathematics courses offered at the developmental level. These courses cover mathematics content normally included in middle schools and high schools. Typically, students are placed in these courses after scoring low on placement tests given to entering freshmen.

Most of these courses have one of three formats. Some colleges maintain computer laboratories where students work through computer-assisted lessons and exams to reach a passing level. A second format is the self-paced course where students work through textbook lessons at their own paces, passing tests on each topic after they become prepared. Third, some colleges offer their developmental courses in mathematics through traditional classes similar to those used for regular courses. Under all these formats, the student frequently is expected to learn a list of computational skills and rote word problem-solving techniques.

Under mathematics reform, the nature of these courses is changing. The need for college students to develop quantitative literacy is being recognized. As students increasingly become expected to acquire conceptual understandings of basic mathematics and to be able not only to apply, but also to communicate these concepts to others, the nature of developmental courses will change.

Courses will include more peer interaction, writing, and real problem solving, with the awareness that the expected outcomes of these activities are not easily developed in a short time. It is important, under these conditions, that students who are deaf not be left behind. The classroom climate should be conducive to encouraging deaf and hard of hearing students to participate fully as equal partners with other students.

**Interpreting and other academic support services**. Instructors may believe that if a deaf or hard of hearing student has academic support services such as an interpreter, notetaker, tutor, real-time speech to text, assistive listening device, or some combination of these, he/she will have the same access to the ideas presented in the class as his/her hearing classmates. Unfortunately, as useful as these services may be, they cannot fully compensate for the information gained auditorily by hearing students. The limitations of all these services are discussed in considerable detail in other reports devoted to the respective services.

For example, interpreters often do not themselves understand the mathematics content they are asked to interpret, reducing the accuracy with which they pass on the instructor's intent to the deaf student. Also, despite the in-class benefits of an interpreter or an assistive listening device, when discussions take place as they often do in "reform" classrooms, deaf and hard of hearing students are likely to find the ideas and comments that leap from person to person difficult to follow and even more difficult to participate in.

**Dual input modes**. Many mathematics instructors provide verbal explanations while simultaneously writing information on the chalkboard. A deaf student uses only the visual mode, so he/she cannot parallel process the auditory information as a hearing student does. Also, many deaf and hard of hearing students use speechreading as an aid to understanding. In speaking as they write on the chalkboard, instructors are inadvertently depriving the deaf and hard of hearing student of this aid. When the instructor must speak and write simultaneously, use of the overhead projector is recommended as a substitute for the chalkboard.

## Recommendations for Improving Mathematics Skills

For reasons that have been discussed, many deaf students enter college with severe deficits in mathematical skills. Yet most of these same students can profit significantly, sometimes dramatically, from quality reform-oriented instruction. The following recommendations may serve as a guide to such reform.

- *Emphasize concepts and problem solving.* Developmental mathematics courses need to involve more activities that focus a student's attention on individual and group problem-solving strategies and the meaning of concepts, involving peer discussion and writing about mathematical ideas. Instructors (and tutors) need to emphasize concept learning over skills memorization. A quick memorization trick cannot replace the need to understand the underpinnings of an idea.

- *Encourage metacognitive activities.* Activities that focus students' attention upon how they think and deal with problems need to be a part of every mathematics course. Providing an operational list of specific cognitive skills and asking students to identify when and how to use them can be very helpful. Students should be encouraged to apply these skills intentionally in problem solving and concept acquisition to improve their awareness of effective thinking habits as applied to mathematics.

- *Provide the time and interaction necessary for success.* Too often, students in need of basic academic preparation are expected to overcome all their deficiencies in a one-semester developmental course. Not only may this be unrealistic, but it may also set students up to fail again, reinforce their feelings of inadequacy, and strengthen their avoidance mechanisms.

Immediate, dramatic results are rare, especially when working toward changing the very way students think and approach learning. The students' course schedules should be structured to offer them the time to develop the understandings and cognitive skills necessary for future success, and students may need to be advised to extend the time frames of their programs to enable this to occur.

- *Maintain high expectations.* It is tempting to help students with deficiencies through a program by lowering the expectations for these students. However, such action is counterproductive. Some deaf and hard of hearing students already have low self-esteem, and they need to realize that they can in fact achieve at acceptable levels.

## The First-Year Experience

**Students at risk**. While the retention literature in higher education considers students with particular characteristics to be "high risk" students, the reality suggests that all first- year students are to some extent at high risk. This is particularly true for deaf students. In fact, most of these students do not graduate. Stinson and Walter (1992) report that two and four-year colleges with programs for deaf

students graduate an average of five deaf students for every 16 they admit, resulting in a retention rate of only 31%. This compares with a 42% retention rate among hearing students in two-year colleges and 70% in four-year colleges (Tinto, 1987).

If students, deaf and hearing alike, can successfully complete their first year in college, the odds improve considerably that they will persist to graduation. If for no other reason than this, the quality of their first-year experience is of great importance.

Like most freshmen, deaf and hard of hearing students entering college need to develop better study habits and time management skills. In addition to honing these skills, they may also need to develop self-advocacy skills, and to shake off habits of dependency that they may have been inadvertently encouraged to develop in high school or earlier. Moreover, they may need to learn to make better and more "consumer-wise" use of interpreters and other service providers, and the various assistive technologies described elsewhere in these reports. And in addition, like all students, they must acquire all the survival skills and knowledge they will need to survive within the college environment. For some of these, they will need help.

**First year Seminars**. First Year or Freshman Seminars have appeared on college campuses nationwide. On many campuses, these have become a special support system for new students and a first line of defense against student attrition. These seminars take two forms: as an extended orientation - a college survival, student-success orientation, or as an academic seminar in which first-year students are placed with faculty members in small class settings to explore "scholarly topics".

Of the two orientations, the extended orientation is probably the more beneficial to deaf and hard of hearing students. The most common goals for these seminars include: developing academic skills, providing knowledge of campus resources, and easing the high school-college transition. According to Barefoot (1994), the leaders of these seminars nationwide were asked to list the five most important course topics covered in their seminars. In descending order of frequency, these were:

1. basic study skills
2. time management
3. introducing participants to campus facilities and resources
4. wellness issues - with the specific areas covered changing over time
5. relationship issues.

Topics included in these seminars often cluster around common themes such as improving classroom skills, broadening academic skills, academic planning, and personal growth. Academic planning can be done with an advisor/advocate and may include not only course selection, but also faculty selection (choosing faculty who best match the student's learning needs and preferences).

Improving classroom skills often involves the discussion of "college survival" techniques. Many freshmen (deaf, hard of hearing, and hearing alike) do not have the skills to manage time or set priorities. These should be assessed early in the freshman year, with suggestions for improvement as needed. Study skills, including how, when, and where to study, should be a part of the seminars. When basic study skills are addressed, "real life" examples should be used. Time logs should be real. Study skills should be taught when studying for actual tests. In turn, debriefing on tests helps students to see what could be done for improvement. A basic tenet throughout these seminars is that once learned, skills must be applied to reach deeper levels of meaning.

Discussions about learning styles can provide clues for students as they assume more and more control of their learning. There are numerous learning inventories on the market that can be used to help the student better understand his/her favored learning style and its implications. The Meyers-Briggs Type Indicator, based on Carl Jung's theory of psychological types, is one such example. Notetaking skills can be taught. The fact that the deaf or hard of hearing student uses notetaking as a support service does not obviate the value of the skill when a notetaker is not available in class or in the student's future outside the classroom and college. Approaches to reading college textbooks can also be discussed.

Study groups can be formed in which students learn from each other and reinforce study/assignment techniques and practices. Student group work also encourages a peer support network which, in addition to aiding in academic progress, is a key component in student retention.

These seminars can also help students explore their values. They can and should explore issues of racial and ethnic diversity on campus. On campuses with significant numbers of students with disabilities, including deaf and hard of hearing students, these students are also part of that diversity.

Campus resources can be discussed in these seminars. Some resources such as speech and hearing clinics may be of particular interest to deaf and/or hard of hearing students. Accessibility to all the resources available to students (including student activities such as concerts and speaker series) is of concern to deaf and hard of hearing students.

Where several deaf or hard of hearing students are involved in these seminars, special sections for these deaf and hard of hearing students might be established to focus on topics of particular relevance to their needs. However, participation in these sections should be elective for at least two reasons. First, some of these students may not wish to be identified as members of such a section. Second, while many deaf and hard of hearing students have some things in common, e.g., the use of a notetaker, their real and perceived needs may be different in many ways. These differences must be respected.

## In closing

Deaf and hard of hearing students are a diverse group. Like all entering college students, they present new challenges to educators and should have a reasonable chance of meeting the standards established by their institution. However, without basic competencies in English, mathematics, and problem solving and study skills, they cannot continue in college-level courses. Unfortunately, for many students a repeat of approaches is a repeat of what has not worked in the past.

Assessment of individual skills and learning styles must be done in an effort to tap into what works best for each student. For some students, "plugging into" existing courses with or without interpreters works. For others, self-contained classes are the answer. Regardless of the initial approach, ongoing assessment of student progress must be made. If students are not successful in one environment, educators should recommend a different placement, even if that means recommending a transfer to a different institution. Fortunately, many colleges, especially two-year schools, have mainstream basic/remedial instruction programs already in place.

But unfortunately, many of these programs do not deal with the types of academic problems deaf and hard of hearing students may present. In some instances, these freshmen perform at levels below the lowest levels of remediation that their colleges are prepared to provide; other students have "gaps" in their knowledge base that the curricula do not address. For these students, the benefits of a college education are effectively denied unless colleges can create programs which meet their special needs.

At the same time, we must be cautious in completely isolating deaf and hard of hearing students in basic instruction and remedial courses. Shunting certain students off into these kinds of courses neither totally removes their deficiencies nor addresses the needs of better prepared students who do not strictly speaking require remediation. At worst, relying on remedial or developmental programs alone for unprepared students may create academic ghettos and convince some, particularly first-generation and minority students, that they are not "college material" (Erickson & Strommer, 1991).

To develop basic and remedial programs that genuinely promote student success requires innovation and careful examination of needs. Some such innovations integrate the expertise of ESL instructors with that of linguistic specialists to create viable ESL programs for deaf students. Others introduce new courses, including those stressing cultural literacy. Regardless of the specific approach, programs which address the needs of these students must address the whole student if they are to be genuinely successful. Such programs must recognize that in the first eventful and trying year of college, deaf and hard of hearing students may need to develop self-advocacy skills, to learn to use interpreting and other services in a more "consumer-wise" manner, as well as tackle the other issues, academic and personal, that all students face.

## Postscript pertaining to laws and regulations[1]

If there is an overall difference between the I.D.E.A. and § 504/ADA, as they relate to the students themselves, it is the level of independence and self-advocacy required of students under § 504 and the ADA. The I.D.E.A. is an educational statute. § 504 and the ADA are civil rights statutes providing for equality of opportunity. Thus, under § 504 and the ADA, remedial programs or courses, or specialized tutoring such as some of those suggested in this report are **not required** by law. An institution is free to conduct remedial classes and many institutions do. However, a deaf or hard of hearing student does not have, as a matter of law, the right to tutoring or remediation in any form. They do have a right to auxiliary aids and services and academic accommodations. They have the right to access the same type of tutoring which the institution provides to nondisabled students, if any. This may be insufficient for deaf or hard of hearing students' real needs, but it is all the institution is required to provide.

A critically important issue pertaining to language of choice was discussed in this report. If deaf and hard of hearing students do not have the basic language and math skills necessary for college-level work in English, they will not be successful in postsecondary education. Political discussions of ASL vs. Signed English or bilingual/bicultural concerns are terrific topics for academic discussion and creative thinking, but they have no place as a substitute for English in postsecondary education. This is not to say that interpreters should not use ASL in the classroom. It means that after the classes are over, deaf students need to do their homework, write their term papers, and take their math tests. This requires basic English and math skills. Just this past summer [1997], the City University of New York's decision not to permit Latino students who were unable to pass an English proficiency test to graduate, was upheld in New York Supreme Court.

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[1] Contributed by Jo Anne Simon, consultant/attorney specializing in laws and regulations pertaining to students with disabilities.

## REFERENCES


American Mathematical Association of Two-Year Colleges. (1995). *Crossroads in mathematics: Standards for introductory college mathematics before calculus*. Memphis, TN: American Mathematical Association of Two-Year Colleges.

Allen, T. (1995). Demographics and national achievement levels for deaf and hard of hearing students: Implications for mathematics reform. In C. Dietz (Ed.), *Moving towards the standards: A national action plan for mathematics education reform for the deaf*. Washington, D.C.: Gallaudet University Pre-College Programs.

Bahan, B. (1989). Total communication: A total farce. In S. Wilcox (Ed.), *American deaf culture: An anthology*. Burtonsville, MD: Linstock Press.

Baker-Shenck, C. & Cokely, D. (1980). *American Sign Language: A teacher's resource text on grammar and culture*. Washington, D.C.: Gallaudet University Press.

Barefoot, B. (1994). *Recruitment and retention in higher education*. 9, (1). Madison, WI: Magna Publications.

Barnum, M. (1984). In support of bilingual/ bicultural education for deaf children. *American Annals of the Deaf*. 129. 404-408.

Charrow, V.R. & Fletcher, J.D. (1975). English as the second language of deaf children. *Developmental Psychology*. 10(4), 463- 470.

Charrow, V.R. & Wilbur, R.B. (1989). Deaf children as a linguistic minority. In S. Wilcox (Ed.), *American deaf culture: An anthology*. Burtonsville, MD: Linstock Press.

Daniele, V. (1993). Quantitative literacy. *American Annals of the Deaf*. 138 (2).

Dietz, C. (Ed.) (1995). *Moving towards the standards: A national action plan for mathematics education reform for the deaf*. Washington, D.C.: Gallaudet University Pre-College Programs.

Erickson, B.L. & Strommer, D.W. ( 1991). *Teaching college freshmen*. San Francisco: Jossey-Bass.

Feuerstein, R. (1980). *Instrumental enrichment: An intervention program for cognitive modifiability*. Baltimore, MD: University Park Press.

Hinkle, W. & White, K. (1979). Assessment and educational placement. In M. Bishop (Ed.), *Mainstreaming: Practical ideas for educating hearing-impaired students*. Washington, D.C.: Alexander Graham Bell Association for the Deaf.

Humphries, T., Martin, B. & Coye, T. (1989). A bilingual, bicultural approach to teaching English. In S. Wilcox (Ed.), *American deaf culture: An anthology*. Burtonsville, MD: Linstock Press.

Kannapell, B. (1974). Bilingualism: A new direction in the education of the deaf. *The Deaf American*. 26 (June).

Mounty, J.L. (1996). Princeton, NJ: Educational Testing Service.

National Council of Teachers of Mathematics (1989). *Curriculum and evaluation standards for school mathematics*. Reston, VA: National Council of Teachers of Mathematics.

National Council of Teachers of Mathematics (1991). *Professional standards for teaching mathematics*. Reston, VA: National Council of Teachers of Mathematics.

Spragins, A.B. Stanford Achievement Test, Eighth Edition (1989). In "Reviews of four types of assessment instruments used with deaf and hard of hearing students: Test of academic tests". [World Wide Web document] URL: http://www.gallaudet.edu/cartraxle/spragins4.html.

Stinson, M. & Walter, G. (1992). Persistence in college. In Foster, S. & Walter, G. (Eds.), *Deaf students in postsecondary education*. New York: Routledge.

Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student attrition*. Chicago: University of Chicago Press.

Zieziula, F. (Ed.). (1992). *Assessment of hearing-impaired people*. Washington, D.C.: Gallaudet University Press.